

**REMARKS**

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated May 5, 2005 has been received and its contents carefully reviewed.

Claims 4, 7, 15, and 20 are hereby amended; claims 8 and 18 are hereby canceled. No new matter has been added. Accordingly, claims 4-7, 9-10, 15-17, and 19-20 are currently pending. Reconsideration of the pending claims is respectfully requested.

Accompanying this amendment, Applicants also submit a revised declaration statement from Dr. Bun Yeoul Lee. Applicants present that the declaration, as revised, overcomes the objections made in the Final Office Action and supports a finding of non-obviousness. Accordingly, Applicants respectfully request that this declaration be considered.

Applicants would like to thank the Examiner for the courtesy extended during the interview on July 29, 2005. During the interview the Examiner elaborated upon his interpretation of the prior art and explained his position with respect to the obviousness rejection. After review of the prior art references cited in the rejection, the Examiner agreed that none of the prior art references explicitly teach an end-group “A” as claimed. Additionally, the Examiner agreed that the Korean Patent 98-25282 (hereinafter “Lee II”) and European Patent Application EP 0839836 A1 (hereinafter “Sancho Royo”) only teach metallocene compounds with end groups that contain Si atoms. Furthermore, the Examiner agreed that none of the prior art references taught a metallocene compound with a methyl chain of 4 to 8 terminating with a oxygen atom followed by an organic compound that did not contain Si. The Examiner, however, stated that the rejection presented in the Final Office Action is proper because the shortcomings of the prior art are rendered obvious to one of ordinary skill in the art in light of the principles

found in the existing case law. The Examiner also stated that a showing of unexpected results with respect to these features would overcome the obviousness rejection.

In the Office Action, claims 4-10 and 15-20 are rejected under 35 U.S.C. §103(a) as being unpatentable “over any of” U.S. Patent No. 5,814,574 (hereinafter “McNelly”), Lee II, Sancho Royo, or U.S. Patent Application Publication No. 2003/0144135 A1 (hereinafter “Llinas”). Applicants respectfully traverse this rejection as being improper and for failing to present a *prima facie* case of obviousness.

According to 37 C.F.R. 1.113, upon making a final rejection the Examiner “shall repeat or state all grounds of rejection then considered applicable to the claims in the application, clearly stating the reasons in support thereof.” This was simply not done.

To establish a *prima facie* case of obviousness three basic criteria must be met. MPEP §2143. There must be some suggestion or motivation to modify the reference or combine the teachings of the different references, there must be a reasonable expectation of success, and the prior art references must teach or suggest all the claim limitations. MPEP §2143 (emphasis added).

The Final Office Action fails to make a *prima facie* case of obviousness because it fails to meet at least two of the three criteria outlined above. The Final Office Action fails to provide a clear reasoning as to why there would be a motivation to combine and modify the teachings of the prior art. Additionally, the rejection presented in the Final Office Action is based on prior art that does not teach, either explicitly or implicitly, all the elements of the claims.

The Final Office Action mailed May 5, 2005 states “Claims 4-10 and 15-20 are rejected under 35 U.S.c. 103(a) as being unpatentable over any of McNally, LeeII, Sancho Royo, or Llinas as cited in and as discussed in the final rejection of 10/15/04.” *See page 2, Office Action 05/05/2005.* The Final Office Action mailed on October 15, 2004 states that each prior art

reference "discloses the invention substantially as claimed" except that none of the references "explicitly discloses that the silica support has been dehydrated or that the surface species of the silica support after reaction with the transition metal compound is an alkoxy wherein the alkoxy group comes from the transition metal compound by cleavage of an O-A' bond." *See page 4, Office Action 10/15/2004.*

Neither Office Action "clearly states" the grounds of rejection that the Examiner presented during the interview on July 29, 2005. In the July 29, 2005 interview, the Examiner agreed that the A' species, the lack of Si atom, and the length of the carbon chain in combination with the remaining elements are not present in the prior art either implicitly or explicitly. The Final Office Actions simply do not address these shortcomings. The Final Office Actions also do not present a clear reasoning as to why the claimed subject matter would be obvious based on the existing case law even though the prior art does not teach all the elements of the claims.

For the above reasons, the Final Office Action mailed on May 5, 2005 is improper. Accordingly, Applicants respectfully request that this rejection be withdrawn and either allow the pending claims or in the alternative issue a second rejection that clearly sets forth a *prima facie* case as required by the rules of practice.

Notwithstanding the fact that the rejection presented in the Final Office Action insufficiently discusses the grounds of rejection, Applicants also traverse the rejection presented in the Final Office Action on the grounds that the prior art does not render the claimed invention obvious.

With regards to the amendment made to the claims, Applicants would first like to clarify that this amendment does not raise new issues because it merely incorporates in the independent claims a limitation previously claimed in dependent claims 8 and 18. Because these limitations were present in the original claims they have already been considered by the Examiner.

Accordingly, it is proper for the Examiner to enter the amendment at this stage of the examination.

As amended the pending claims are not obvious over the cited prior art. The cited prior art fails to render obvious a supported metallocene catalyst “obtained by using a dehydroxylated silica support of the formula including a hydroxyl group amount of less than 0.5 mmol/g silica” as recited in the amended independent claims.

This limitation is not obvious over the teachings of the prior art because it has unexpected results associated therewith. As discussed in the specification of the present application, having a low hydroxyl group amount of less than 0.5 mmol/g silica minimizes side reactions during the supporting process. *See Specification, pages 23-26 as filed, and [0091] – [0099].*

Accordingly, Applicants respectfully request that the rejection be withdrawn at least for these reasons.

The cited prior art references also do not render the present invention obvious because the structure of the metallocene compounds found in the cited references is different from that presently claimed.

Specifically, the structures found in the cited prior art references do not have the “-Si-O-” structure of “-Si-O-(CH<sub>2</sub>)<sub>a</sub>-Cp-” that is found in the structure of the present invention. Additionally, the cited prior art references do not teach the metallocene structure of the present invention because they do not teach the “O-A” functional group as claimed. In fact, the cited references do not teach or suggest a structure with the supported catalyst of the present invention wherein the O-A’ bond of the terminal groups is broken by a reaction with the functional group existing in the surface of the dehydrated silica to obtain the structure of “-Si-O-(CH<sub>2</sub>)<sub>a</sub>-Cp-” as claimed.

Additionally, even though the use of the dehydrated silica in the present invention and in the prior art is similar, the C-O bond in the metallocene compounds of the cited prior art references are generally transformed back to an alcohol, aldehyde, or ketone when reacted with acid and do not react with a base.

The compound of the present invention is different from the compounds cited in the prior art references because unlike the prior art references it introduces the O-A' functional terminal group. According to the present invention, any one of the C-O bonds present in the O-A' functional group is broken by a siloxane group (Si-O-Si) of dehydrated silica having high reactivity with the O-A' functional group of the metallocene compound. This reaction leads to a new chemical bond on the surface of the dehydrated siloxane that is not present in the cited prior art references. Proof that the C-O bonds in the O-A' functional group are broken is explained in connection with Example 8, found in the specification disclosure of the pending application, wherein butydecyl ether is used instead of the metallocene to confirm the break of the C-O bond.

Therefore, the prior art does not provide the necessary teachings to render the present invention obvious. Accordingly, Applicants request that the rejection be withdrawn.

Furthermore, as recognized by the Examiner during the interview on July 29, 2005, the cited prior art falls short of teaching or suggesting all the elements of the claims and thus cannot render the claimed invention obvious. *See MPEP §2143.*

Specifically, none of the cited prior art references teach or suggest a metallocene compound with a terminal group O-A' wherein A' is “selected from the group consisting of methoxymethyl, t-butoxymethyl, tetrahydropyranyl, tetrahydrofuryl, 1-ethoxyethyl, 1-methyl-1-methoxyethyl, and t-butyl.” The closest compound identified by the Examiner during the interview was a simple methyl group. In light of this shortcoming the Examiner avers that it

would be obvious to switch t-butyl for the methyl group in light of existing case law. Applicant traverses this ground of rejection for two reasons.

First, even if it were obvious to replace the methyl group in the compounds disclosed in the prior art with the claimed t-butyl, one would still not have a compound as claimed. The compound disclosed in the prior art would still not have a 4 to 8 member methyl chain between the Cp group and the O atom, also, unlike the claimed structure, the modified compound of the prior art would still comprise a Si atom in the end group.

Second, the substitution of methyl with t-butyl would not be obvious to one of ordinary skill in the art because the species of A' in the present application leads to unexpected results. Using the end groups claimed in the instant application results in higher activity. Accordingly, it would not be obvious to simply substitute them. An example of similar structures that result in substantially different results is shown in Table 1 of the specification of the pending application, found between paragraphs [0146] and [0147] of the published application, and on page 35 of the specification disclosure as filed.

Specifically, the Applicants direct the Examiner's attention to the data associated with Example 4 and Comparative Example 2. As indicated, the activity was measured for Example 4 and Comparative Example 2 using metallocene compounds that were identical with the exception of the end function group A'. In Example 4, the A' group used was 1-ethoxyethyl, a species recited in the claims. On the other hand, in Comparative Example 2, the A' group used was 2-ethoxyethyl. The activity measured in Example 4 was 79g, while the activity measured in Comparative Example 2 was 7g. The small change in chemical structure between Example 4 and Comparative Example 2 resulted in an activity eleven times higher. This is a clear showing of unexpected results.

As discussed in MPEP §2144, “if applicant has demonstrated the criticality of a specific limitation, it would not be appropriate to rely solely on case law as the rationale to support an obviousness rejection.” (emphasis added). As demonstrated above, criticality with respect to the end group A’ has been shown in this case. Accordingly, it is not appropriate to only rely on case law to demonstrate that such a feature is obvious, which is exactly what the Examiner has done.

Furthermore, in order to rely on legal precedent as a rationale to support obviousness, “the facts in a prior legal decision” must be “sufficiently similar to those in the application under examination.” MPEP §2144.

The rejection presented in the Final Office Action is therefore improper because it does not identify either the case law relied upon, nor how the facts, involved in the case law relied upon, are sufficiently similar to those of the present application.

Additionally, the cited prior art does not render the present invention obvious because it teaches incorporation of a Si atom in the functional end group. According to the pending claims, the metallocene compound has an end group of –O-A’. There is no silicon atoms in the end functional group of the present invention and it would not be obvious to one of ordinary skill in the art to switch a carbon atom for a silicon atom as the Examiner suggests. Accordingly, Applicants request that the rejection be withdrawn at least because of this shortcoming.

It is erroneous for the Examiner to conclude that “based on the principles in existing case law” it would be obvious to substitute a silicon atom for a carbon atom. With respect to this issue, the Examiner is again merely making a conclusion without finding support on the evidence of record. Applicants first would like to point out that again the case law allegedly relied upon by the Examiner is not identified in the Office Action.

Additionally, the presence of silicon in the functional end group was discussed as being undesirable in the specification of the present application, paragraphs [0010] – [0012] of the published application, and page 3-4 of the specification as filed. In discussing the prior art in the background of the specification, Applicants clearly stated that the presence of silicon would lead to the formation of an alkyl alcohol by-product that would lower the activity of the catalyst. Based solely on these remarks, it becomes apparent that a prior art reference that teaches silicon in the functional end group, not only could not render the present invention obvious, but would actually teach away from the present invention.

In support of this latter argument, Applicant also direct the Examiner's attention to paragraph 6 of the declaration accompanying this amendment. In the declaration, Dr. Bun Yeoul Lee evidences the undesirable formation of an alkyl alcohol when silicon is present in the end functional group. Additionally, the declaration shows in Table 2 how the activity of the comparative Examples from Sancho Royo demonstrate a considerably lower activity.

In view of these showings, it becomes apparent that the obviousness rejection is improper. Accordingly, Applicants respectfully request that the rejection be withdrawn.

Another shortcoming of the cited prior art is the value of "a" associated with the carbon chain. The cited prior art does not teach a value for "a" that is 4 to 8, as claimed, in combination with a catalysts that has an O-A' silicon free functional end group. During the interview, the Examiner stated that this limitation would also be obvious in light of the prior art and existing case law. Applicants respectfully traverse this rejection.

The length of the methyl chain provides unexpected results and thus would not be obvious to one of ordinary skill in the art. As discussed in the specification disclosure and further supported by the declaration submitted herewith, it has been demonstrated that a carbon chain of 4 to 8 has unexpected results in a supported catalyst. *See Declaration, paragraph 8, and*

Specification, pages 38-39 of disclosure as filed, and paragraphs [0168] – [0169] of disclosure as published.

In light of these unexpected results, Applicants respectfully request that the obviousness rejection be withdrawn.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue. If the Examiner deems that a telephone conversation would further the prosecution of this application, the Examiner is invited to call the undersigned at (202) 496-7500.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Dated:August 5, 2005

Respectfully submitted,

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